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Contract No. NAS 3-22498

(NASA-CR-174268) THE 20 GHZ
PROOF-OF-CONCEPT TEST MODEL RESULTS FOR A
MULTIPLE SCAN BEAM DUAL REFLECTOR ANTENNA
(Ford Aerospace and Communications Corp.)
15 p HC A02/NF A01
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20GHZ PROOF-OF-CONCEPT TEST MODEL RESULTS FOR A MULTIPLE SCAN BEAM DUAL REFLECTOR ANTENNA

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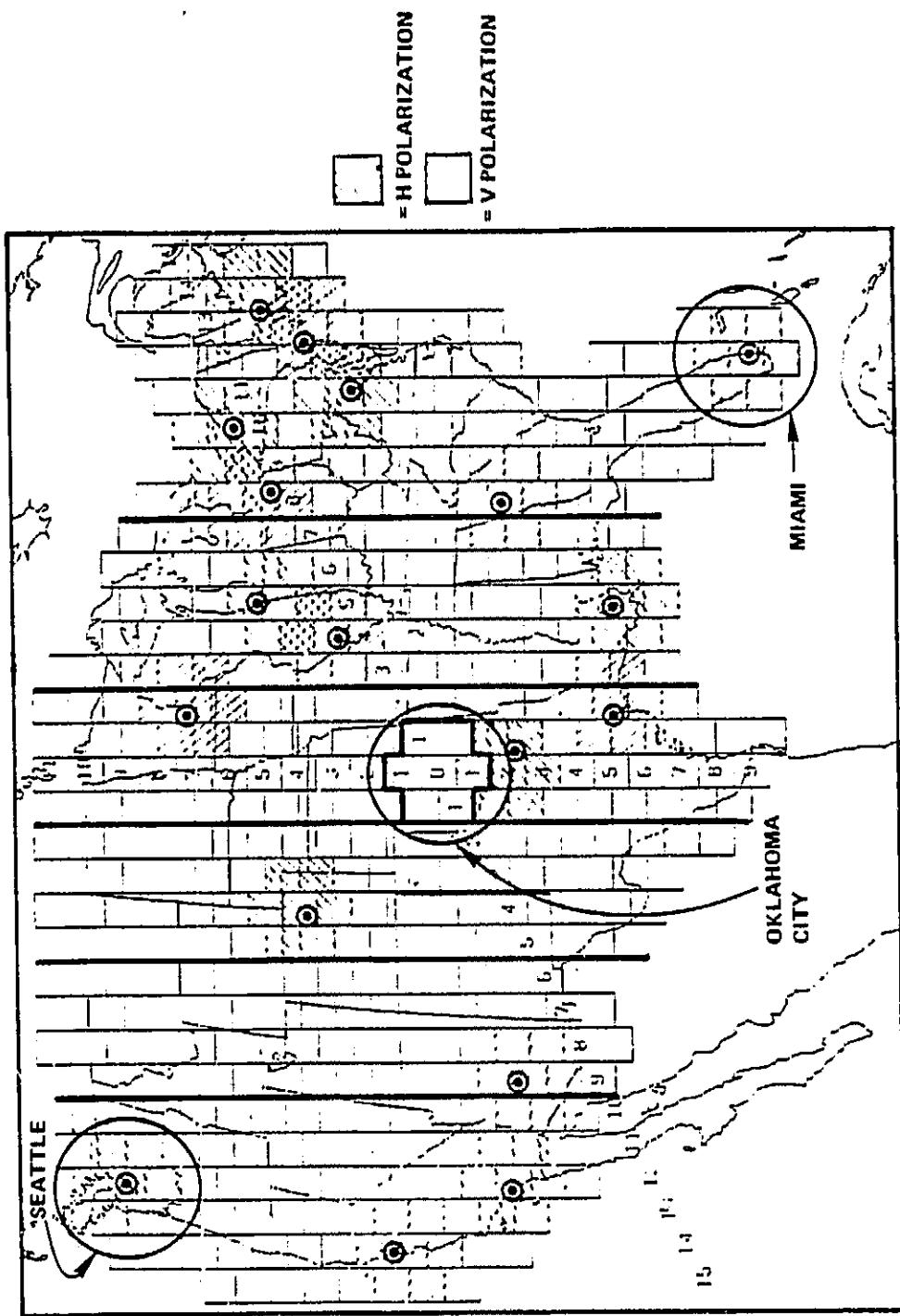
Presented at: IEEE Antenna
Propagation Symposium
Houston, Texas
May 23 - 27, 1983

ABSTRACT

Under Contract NAS 3-22498, NASA Lewis Research Center, we have designed, fabricated, and are testing a full scale 20 GHz antenna model. The model is intended to test the low side-lobe beam scanning capability of a new class of an offset dual reflector and feed array configuration.

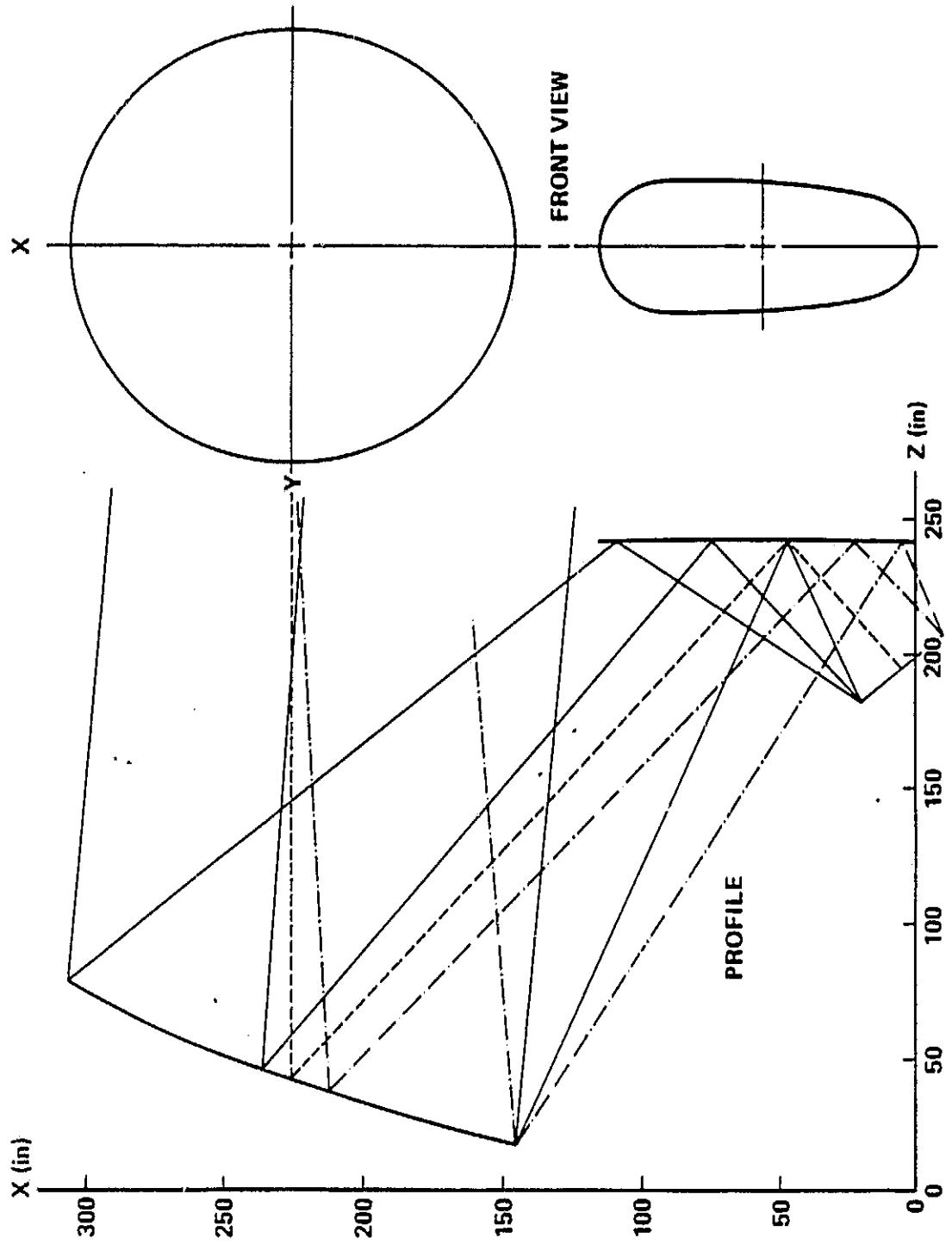
The offset main reflector and subreflector surfaces were custom shaped by a computer synthesis procedure. The optics so derived results in beam scan loss under 1 db over the ± 12.3 beamwidths by ± 5.8 beamwidths scan volume while maintaining low sidelobes. The preliminary test results indicate that the measured and computed patterns are in good agreement.

**CLUSTER EXCITATION FOR THREE BEAM
POSITIONS IN CONUS FEED ARRAY**



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NASA 30/20 GHz REFLECTORS AND FEED CONFIGURATION



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KEY FEATURES

Shaped-Surface Cassegrain Reflector System

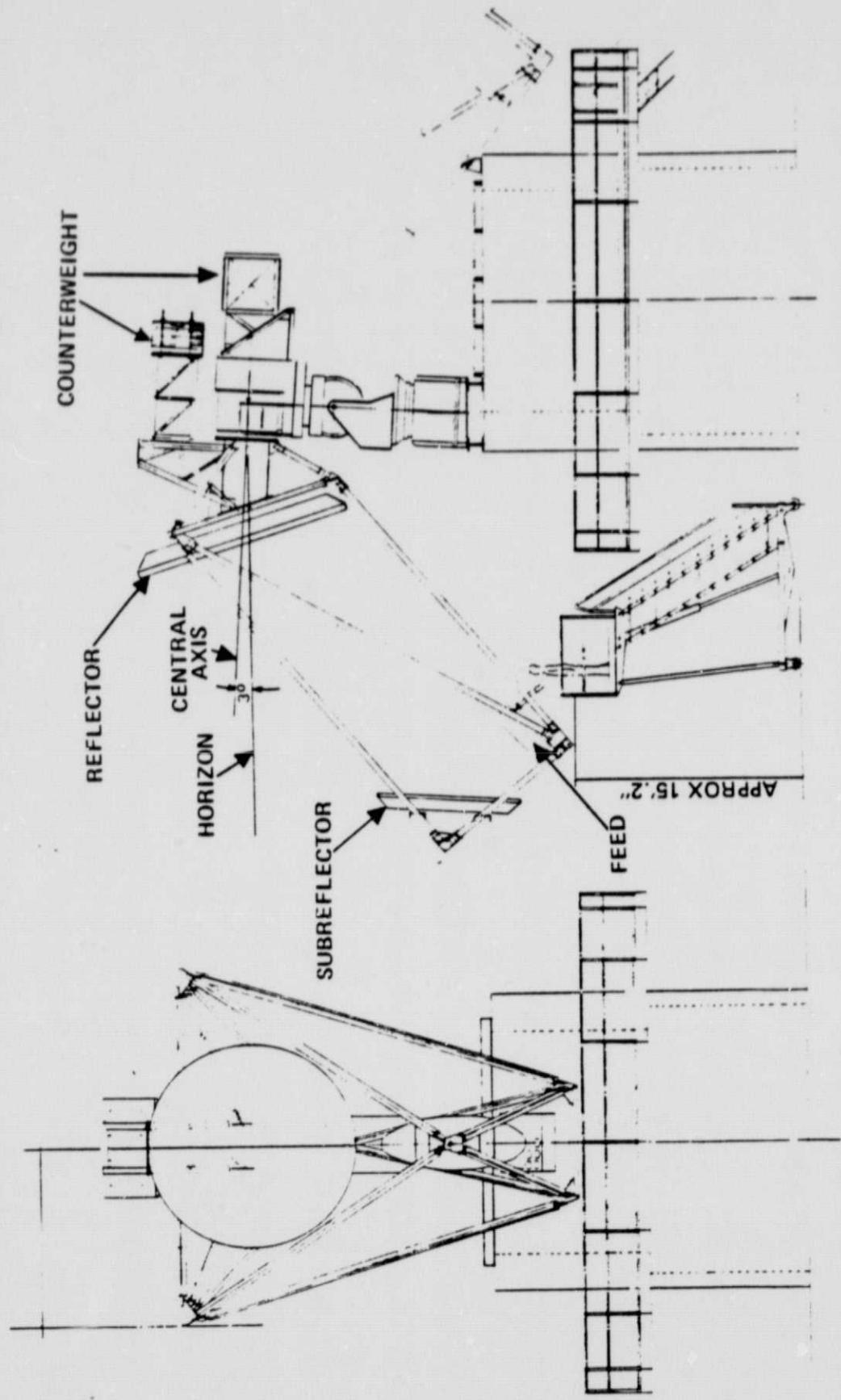
- Minimal (0.5 dB) gain loss over ± 12 beamwidths (0.3° of scan)
- Preservation of low sidelobes at wide scan angles (30 dB scan beam isolation)
- Development of antenna synthesis and analysis computer programs (including GTD)

Unique Beamforming/Switching Feed Networks

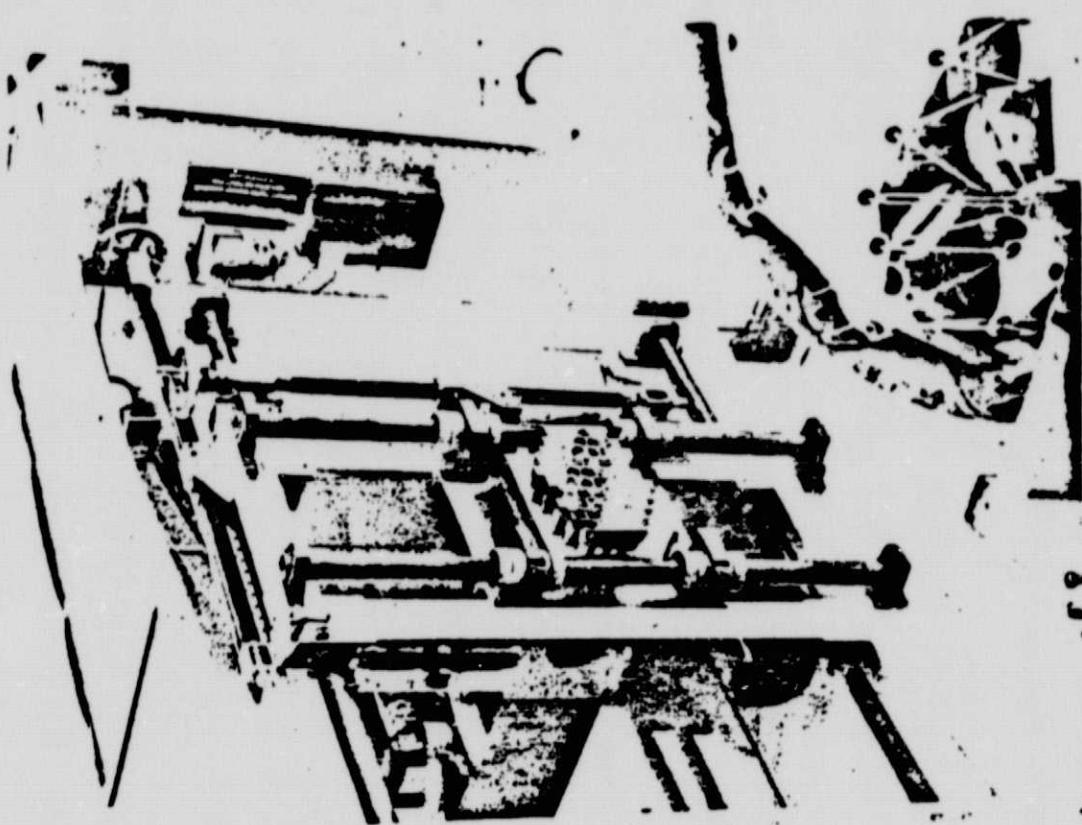
- Utilizes multi-element clusters to minimize cross-polarization and sidelobes
- Beam selection performed by variable power dividers and ferrite switches
- Fast switching time, $< 6.0 \mu\text{s}$

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POC MODEL MBA

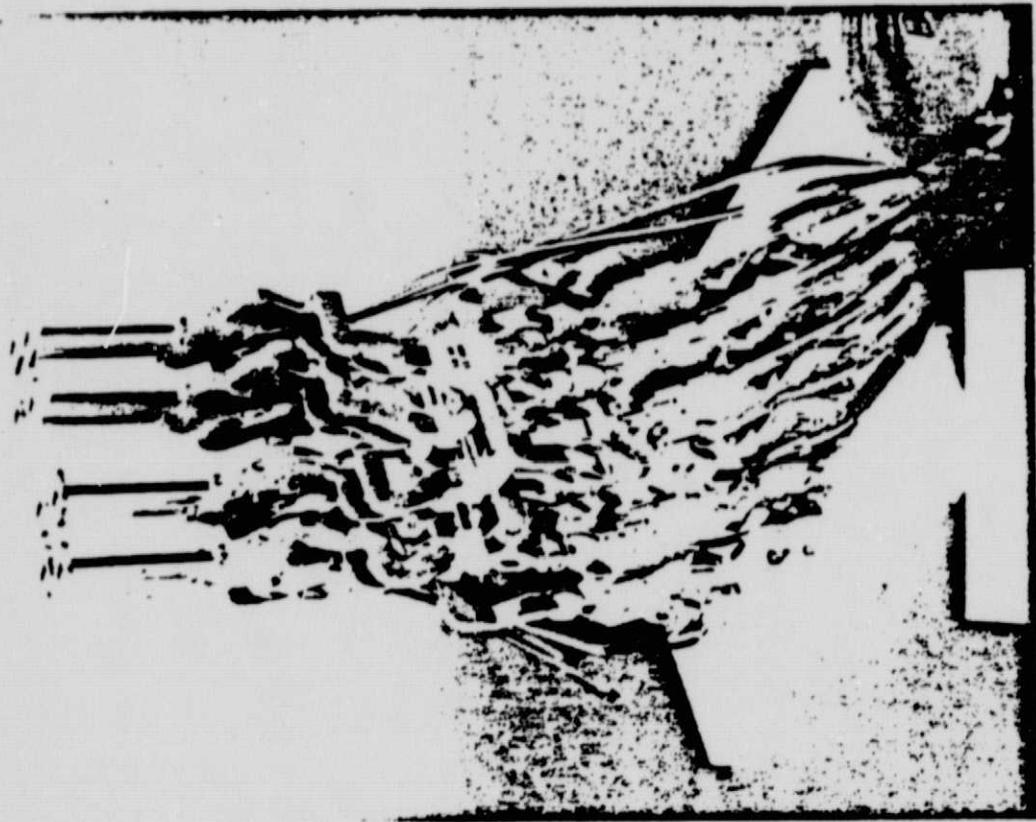


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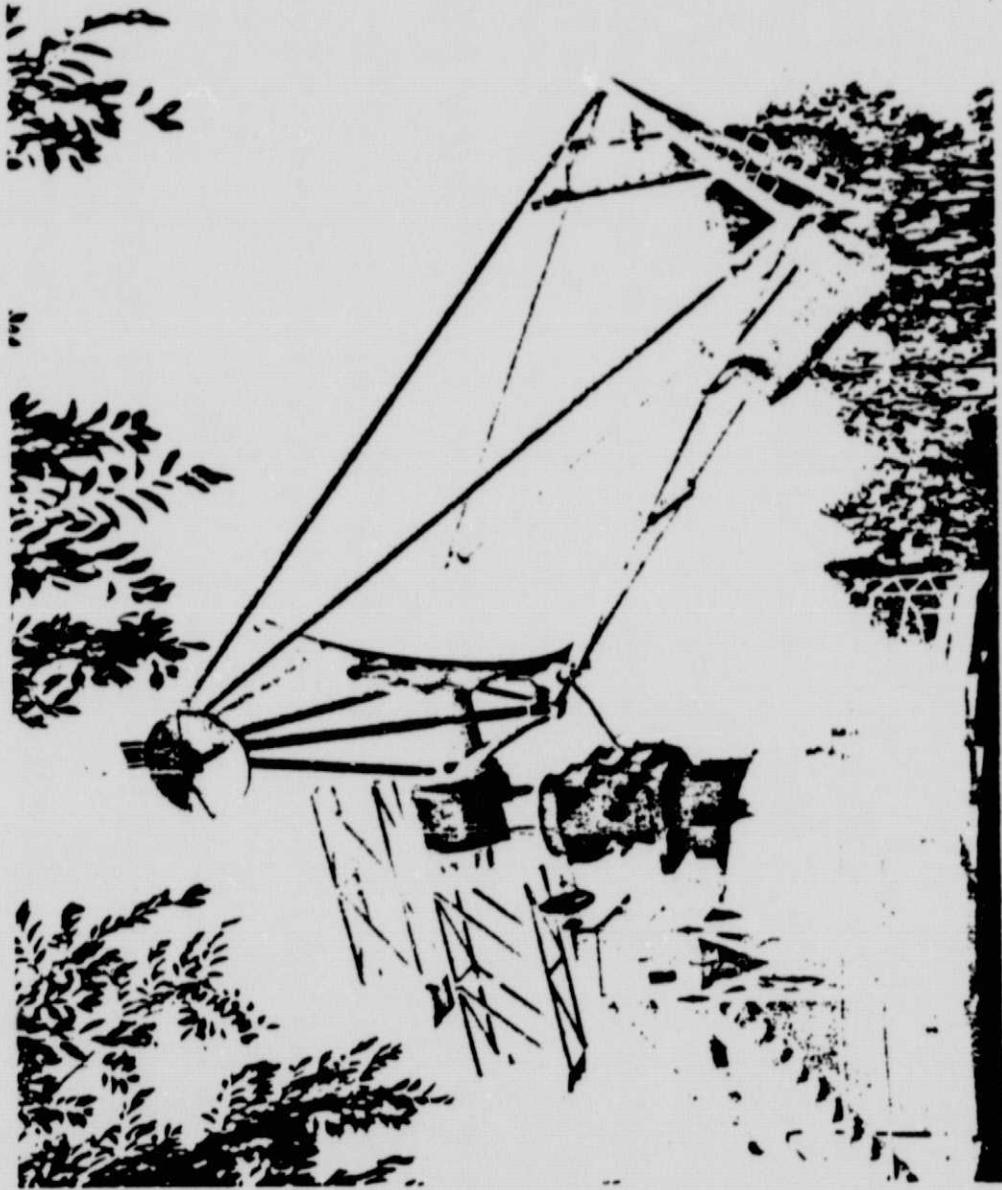
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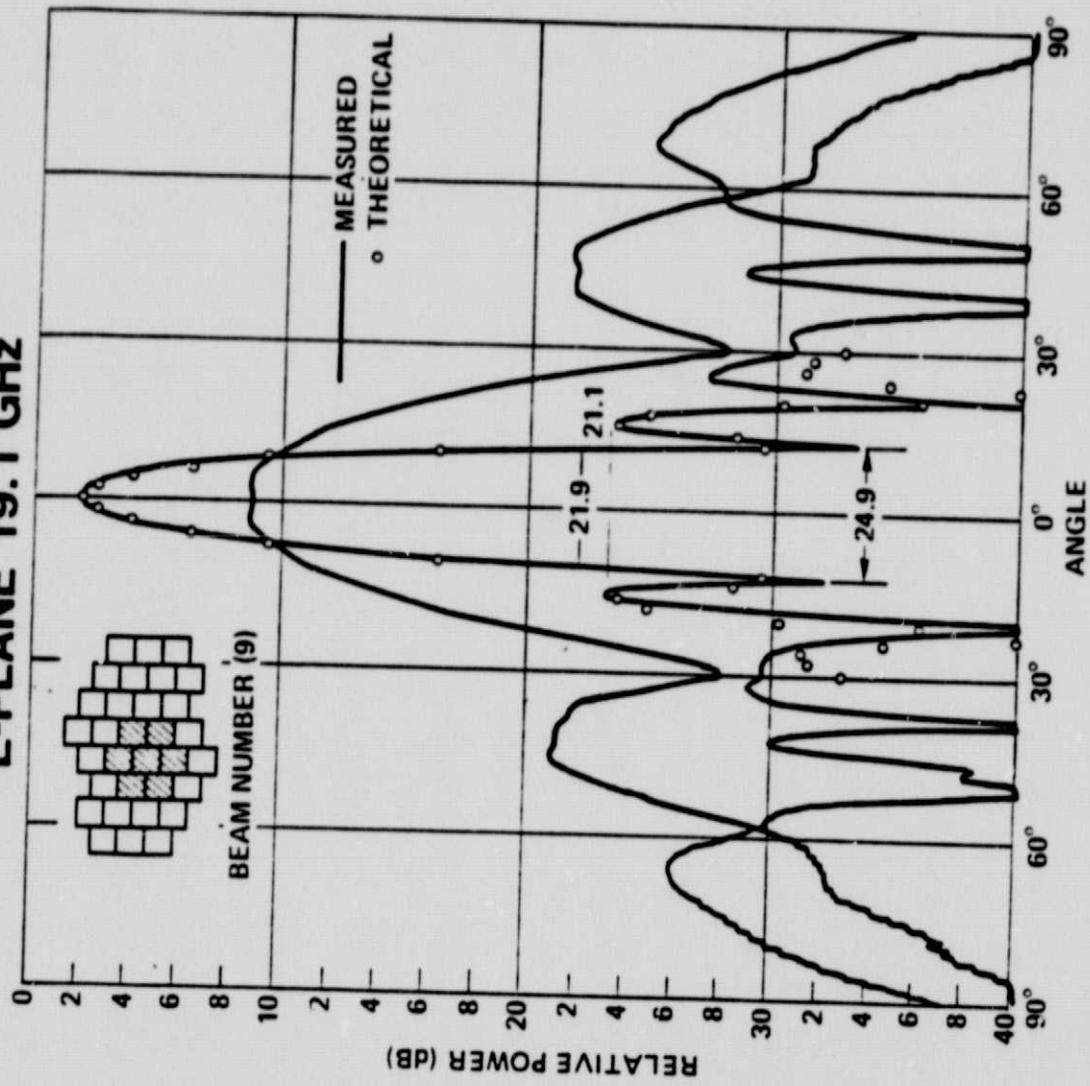
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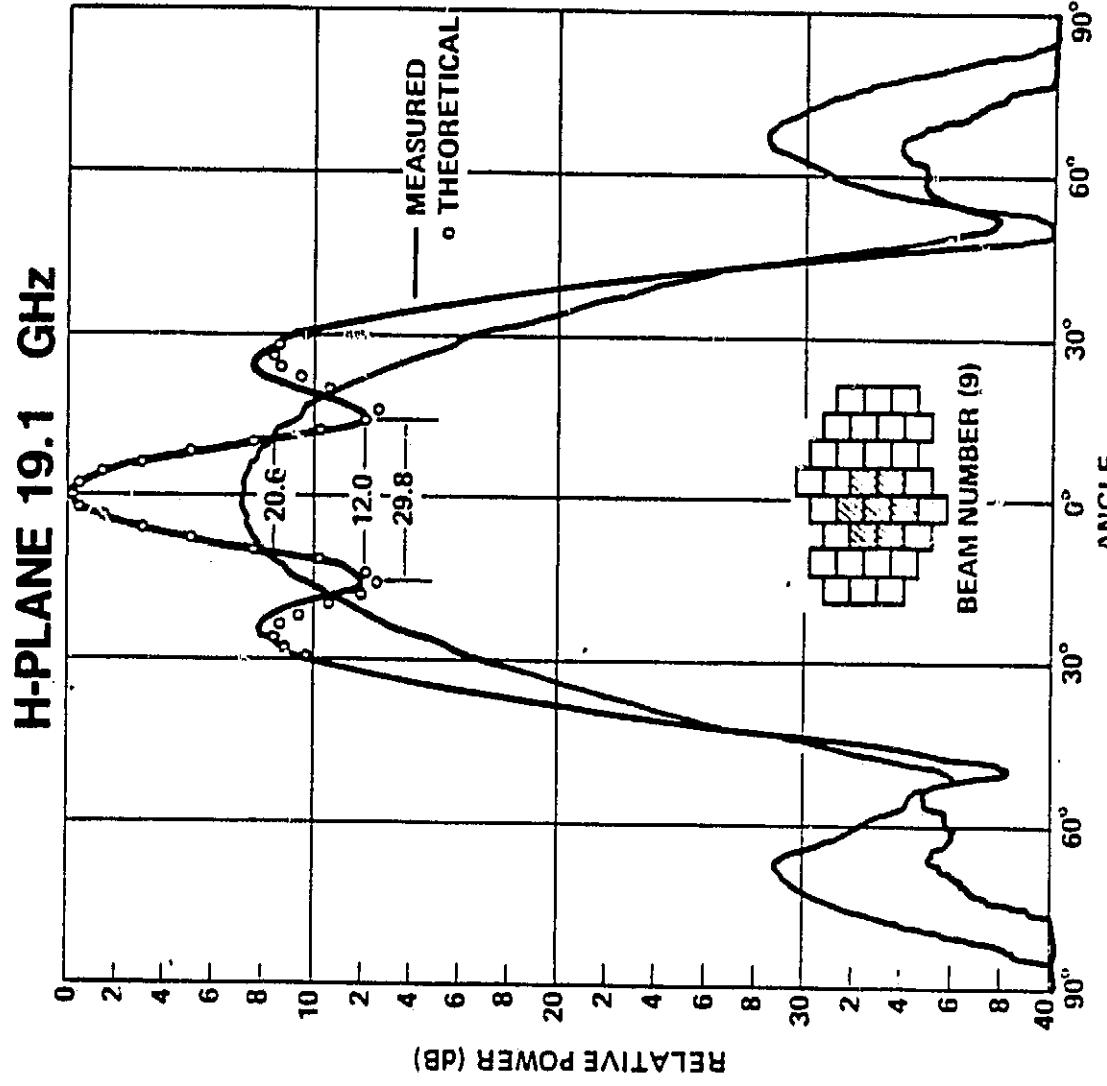
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NASA 30/20 GHz SCAN BEAM PRIMARY PATTERN
SINGLE AND 7-ELEMENT
E-PLANE 19.1 GHz



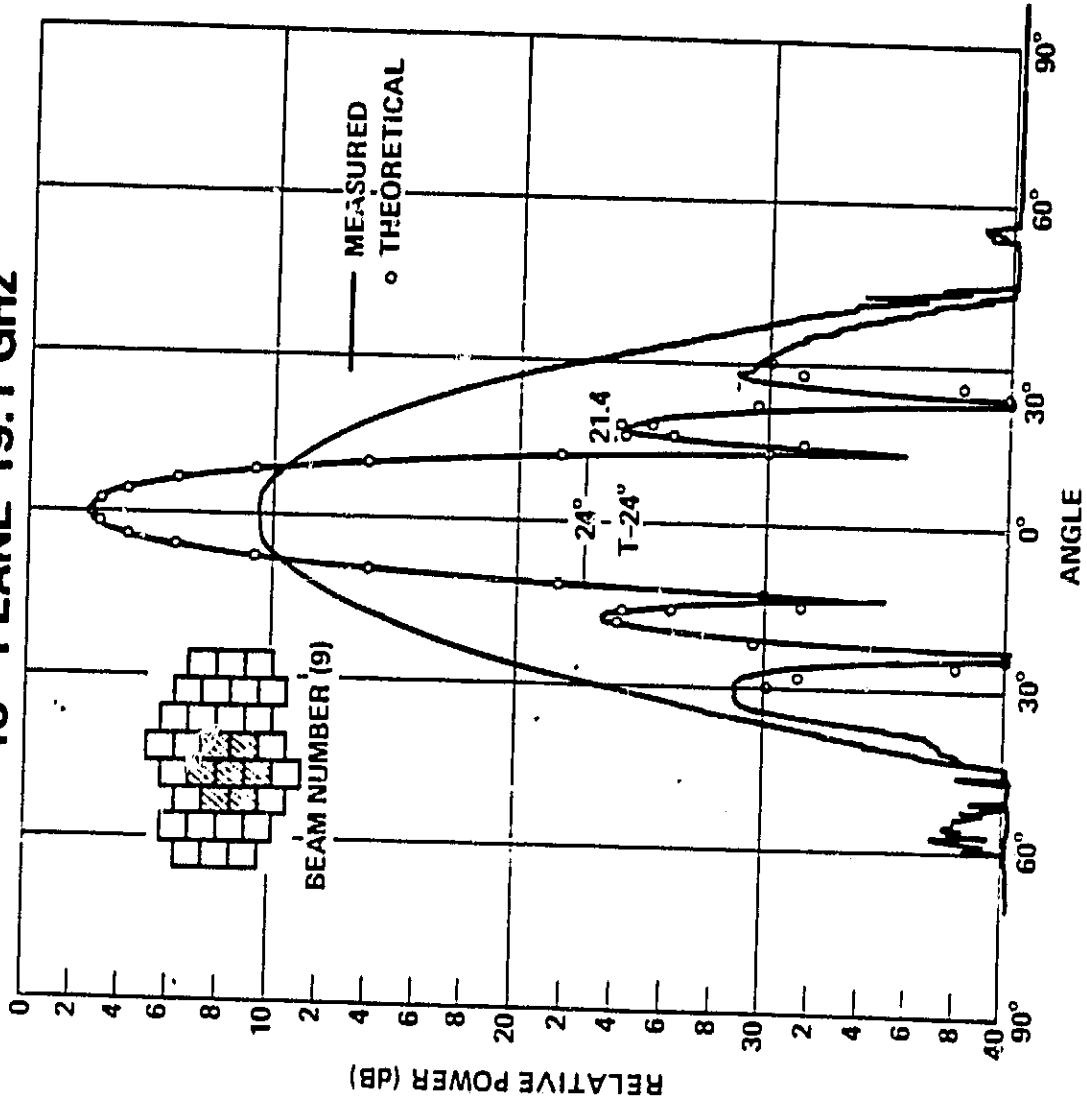
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NASA 30/20 GHz SCAN BEAM PRIMARY
PATTERN SINGLE AND 7-ELEMENT



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NASA 30/20 GHz SCAN BEAM PRIMARY PATTERN
SINGLE AND 7-ELEMENT
45° PLANE 19.1 GHz



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NRG 3420 3420 USA
Baud = 100
 $X_p = 0, Y_p = 0$
Measured AZ Pattern

10

20 (dB)

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30

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0 db

-42 db

